TABLE 3-continued

Hydroxyalkylcarbamylmethylated Melamine Crosslinked Acrylic and Caprolactone Resins

	Example					
	20	21	22	23	24	25
lactone diol)[d]						
EPON ® 1001, epoxy resin[e]	—	—	—	—	14	10
p-Toluenesulfonic Acid	1	1	0.5	0.5	0.5	0.5
FC-431(fluorochemical surfactant)	—	—	0.1	0.1	0.1	0.1
Cure, °C.	125	125	125	125	125	125
Cure Time, min.	20	20	20	20	20	20
Properties						
MEK Resistance	P	P	P	P	P	P
Knoop Hardness	13	9.3	18	15	14	12
Reverse Impact, in. lbs.	10	10	5	5	5–10	15
Direct Impact, in. lbs.	—	—	20–30	20–30	30	50
70° C. Detergent, hrs./ Blister Rating	—	—	24/rust	24/D6	96/10	96/M8
Salt Spray, Hrs./ Creepage (mm)	—	—	96/2	96/7	—	—
Taber Abrasion, mg lost/cycle × 1000	—	—	45	47	67	17

[a]American Cyanamid Co.
[b]Rohm & Haas & Co.
[c]S. C. Johnson & Sons, Inc.
[d]Union Carbide Corp.
[e]Shell Chemical Co.
[f]3M Co.

Excellent coatings are obtained in accordance with this invention.

A review of the data in the foregoing tables indicates that excellent properties are obtained with the beta-hydroxy alkylcarbamylmethylated triazines of this invention.

It is generally the case also, that the beta-hydroxyalkylcarbamylmethylated melamines of this invention afford coatings with good color stability. Finally, the data show that while outstanding resistance properties and color stability have been obtained with the beta-hydroxyalkylcarbamate melamines, other important and desirable coatings properties such as Knoop hardness, impact and solvent resistance (MEK rubs+200) have been maintained as is the case with conventional resins.

The hydroxyalkylcarbamylmethylated-melamines and -benzoguanamines of this invention are useful as binders for fillers and/or reinforcements, e.g., mineral and glass fillers as is illustrated by the following examples.

EXAMPLE 26-27

A binder formulation for fiberglass insulation is prepared and screened in a standard test by binding very fine glass beads in a dogbone shaped bonded test piece. The tensile strength of the test piece is then determined by a standard method.

The binder formulation comprises:

1.33 parts by weight of a 75 wt. % solution of 6-HOPC (the product of Example 1);

8.00 parts of 25 wt. % aqueous low molecular weight starch (RAISIO ® K-55);

0.60 parts additional water; and

0.60 parts of 10% phosphoric acid in water.

The mixture is thoroughly blended with 60 parts by weight of fine glass shot and pressed into two dogbone shaped molds. The pieces are removed from the mold and cured in an oven at 140° C. for 60 minutes. The cured coatings ($\frac{1}{4} \times 1''$ cross section at neck) are found to have tensile strengths of 80 and 110 lbs. (320 and 440 psi) compared to 0 psi with no binder and 10–30 psi for poor binder formulations.

If foundry sand is substituted for glass and coated with the hydroxypropyl carbamylmethylated melamine of this invention, starch and acid, the coated sand will cure into foundry molds eminently suitable for metal casting (little or no formaldehyde odor is detectable upon exposure to foundry temperatures).

The above-mentioned patents and publications are incorporated herein by reference. Many variations of this invention will suggest themselves to those skilled in this art in light of the above, detailed description. For example, instead of reacting hexamethoxymethylmelamine or an oligomer with beta-hydroxypropylcarbamate, tetramethoxymethylbenzoguanamine can be reacted with beta-hydroxypropylcarbamate to obtain a crosslinker according to this invention. Instead of using beta-hydroxypropylcarbamylmethylated melamine as curing agents in the formulations of Tables 1–3, the corresponding beta-hydroxy alkyl carbamylmethylated melamine and melamine oligomers of Examples 2–6 can be used. Instead of p-toluenesulfonic acid as cure catalyst, mineral acids, such as hydrochloric acid and nitric acid can be used. Instead of hydroxyfunctional polyesters and polyacrylates, epoxy resins, such as the polyglycidylethers of bisphenol A and the reaction products thereof with amines and ammonia can be used. All such obvious modifications are within the full intended scope of the appended claims.

We claim:

1. A curable composition comprising:

(a) a triazine compound selected from

(i) a triaminotriazine compound of the formula $C_3N_6(CH_2OR)_{6-x}(CH_2NHCOOR^1)_x$;

(ii) a benzoguanamine compound of the formula $C_3N_5(C_6H_5)(CH_2OR)_{4-y}(CH_2NHCOOR^1)_y$;

(iii) an oligomer of (i) or of (ii); or

(iv) a mixture of at least two of any of (i), (ii) and (iii), wherein the R groups are, independently, hydrogen or alkyl from 1 to 12 carbon atoms, the R^1 groups are, independently, beta-hydroxyalkyl,of from 2 to 18 carbon atoms, alone, or combined with alkyl of from 1 to 18 carbon atoms, x